

High-Efficiency Resonantly Pumped 1550-nm Fiber-Based Laser Transmitter, Phase I

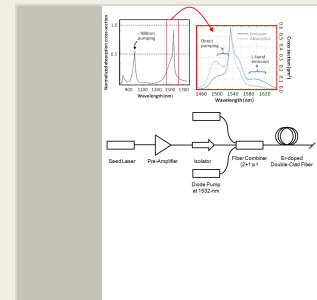
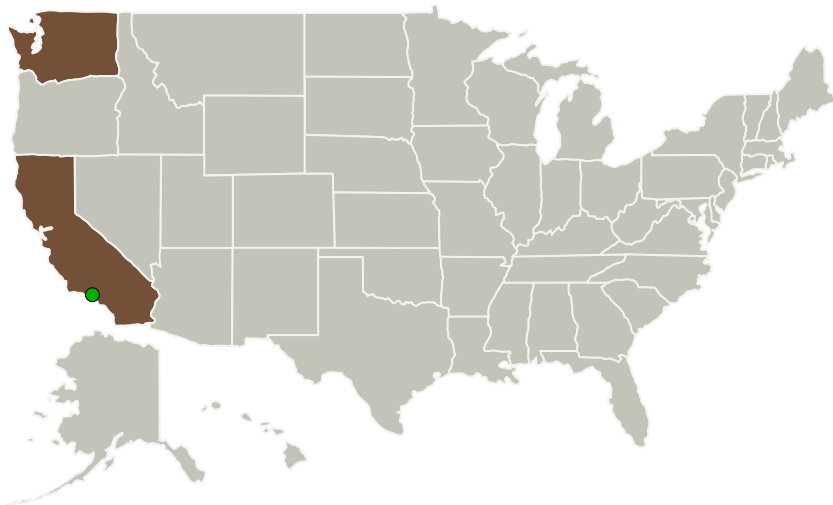
Completed Technology Project (2013 - 2013)



Project Introduction

nLight proposes the development of high efficiency, high average power 1550-nm laser transmitter system that is based on Er-doped fiber amplifier resonantly pumped by high efficiency 1532-nm fiber-coupled diode laser pumps. To meet the efficiency requirement for space communication, nLight proposes to improve overall laser transmitter efficiency by (1) optimizing diode laser and fiber coupling for maximum efficiency of 1532-nm pumps, (2) developing resonant pumping of the fiber amplifier for minimum quantum defect, and (3) design and development of Er-doped fiber amplifier capable of achieving high optical-to-optical efficiency. Under the proposed program, nLight will design and develop high efficiency 1532-nm diode lasers in conjunction with highly efficient fiber coupling techniques to achieve >40% conversion efficiency of the pump modules. By developing and utilizing novel fiber laser amplifier technologies, nLight anticipates achieving > 70% optical-to-optical efficiency for resonantly pumped Er-doped fiber amplifier. It is estimated that a high efficiency 1550-nm fiber laser transmitter will be developed to demonstrate >23 W average power and >23% WPE, the highest efficiency among eye-safe solid-state lasers.

Primary U.S. Work Locations and Key Partners



High-efficiency resonantly pumped 1550-nm fiber-based laser transmitter

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Organizations Performing Work	Role	Type	Location
nLight Photonics Corporation	Lead Organization	Industry	Vancouver, Washington
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Washington

Project Transitions

May 2013: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138256>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

nLight Photonics Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

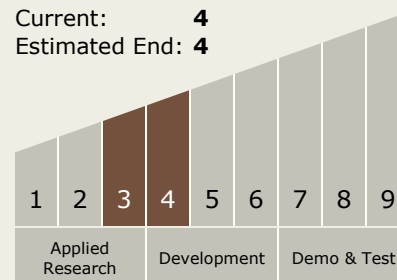
Carlos Torrez

Principal Investigator:

Zhigang Chen

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**

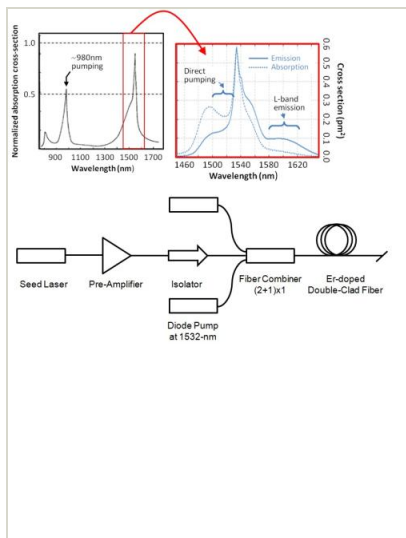


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Images



Project Image

High-efficiency resonantly pumped 1550-nm fiber-based laser transmitter

(<https://techport.nasa.gov/image/130037>)

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - └ TX05.1 Optical Communications
 - └ TX05.1.3 Lasers

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System